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Six hundred and fourteenth Meeting.

December 14, 1869. — MONTHLY MEETING.

The PRESIDENT in the chair.

Letters were read from James M. Barnard and N. S. Shaler, in acknowledgment of their election into the Academy. Also letters relative to the exchanges of the Academy.

Dr. M. Wyman, from the Rumford Committee, reported that the Rumford Medal, voted at the Annual Meeting to Mr. George H. Corliss, was ready for presentation. It was ordered that the presentation be made at the next meeting.

Dr. Jarvis, from the committee appointed at the preceding meeting relative to the ensuing census, made a detailed report, closing with a proposal to present the following memorial to Congress, which was adopted : —

To the Honorable the Senate and House of Representatives in Congress assembled : —

The American Academy of Arts and Sciences respectfully represents, in view of the great importance of a full and accurate enumeration of the people and of the light which it may throw upon the law of population, that the plan proposed by the Committee of the House of Representatives, to whom this matter was referred, is well adapted to their purpose, and they respectfully request that the plan of the Committee (including the prior schedules with the several inquiries in regard to population and the independent corps of enumeration) be adopted for the next enumeration of the people.

Adopted at a meeting of the Academy upon report of a Special Committee, December 14, 1869.

Six hundred and fifteenth Meeting.

January 11, 1870. — MONTHLY MEETING.

The PRESIDENT in the chair.

Professor J. Wyman made a communication on the power of the movement of the vibratory cilia on the tongue of a frog, and illustrated it by experiments with some simple machinery he had devised.

Dr. George E. Ellis made a communication on the genius and character of Count Rumford, and on the history of his endowment in the charge of the Academy.

The President then presented the Rumford Medal to Mr. Corliss with the following address: —

Gentlemen of the Academy, —At the last anniversary meeting, after a careful investigation by your appropriate committee, you awarded the Rumford Medal to Mr. George H. Corliss, for improvements of the steam-engine. The gold medal and a silver duplicate have been struck, and are now before us. The inventor whose genius you have thus recognized has responded to our call, and is now present. If it be your pleasure, these medals will now be consigned to his hands.

Mr. Corliss, — The trust which our countryman, Count Rumford, charged this Academy to administer, empowered it to award these medals "to the author of any important discovery or useful improvement on light or on heat, which shall have been made and published by printing, or in any way made known to the public, in any part of the continent of America or of any of the American islands; preference being always given to such discoveries as shall, in the opinion of the Academy, tend most to promote the good of mankind."

As this is only the fifth occasion since the foundation of the trust upon which this premium has been given, it may well be inferred that the Academy has in no case bestowed it inconsiderately.

It has required the discovery or invention to be real, original, and important. It is not restricted to considerations of direct practical benefit, but it may, as it did in the first instance, in the case of the oxyhydrogen blow-pipe, honor a discovery of much scientific interest, the uses of which are limited. It would not hesitate to crown any successful, however recondite or theoretical, investigation within the assigned domain, being confident that no considerable increase of our knowledge of the laws and forces of nature is likely to remain unfruitful. But the Academy rejoices when, as now, it can signalize an invention which unequivocally tends to promote that which the founder had most at heart, and commended to our particular regard, — the material good of mankind.

Without entering into details, it will be possible to state the ground upon which the present award has been made. It is for the effectual abolition of the throttle valve of the steam-engine, and the transferrence of the regulation by the governor to a system of induction valves of your own invention; with the advantage of a large saving in fuel, and — what is often more important in manufacturing industry — the maintenance of perfectly uniform motion under varying work.

Previous to your improvements, the regulation of the power and velocity of the steam-engine was effected by an instrument placed in the steam-pipe, well named the throttle valve; being used to choke off the steam in its passage from the boiler, to reduce more or less its pressure before it was allowed to act within the engine. Avoiding this wasteful process, your engine embodies within itself a principle by which it appropriates the full, direct, and expansive force of the steam, and measures out for itself at each stroke, with the utmost precision, the exact quantity necessary to maintain the power required. In the most approved engines previously used for manufacturing purposes, the valves employed were comparatively difficult to operate, too far from the piston, and in other respects unfit for working in connection with the governor. Their abandonment, and the substitution of others suitable for the purpose that you had in view, demanded an entire change in the structure of the engine.

In the reconstruction your mastery of the resources of mechanism is conspicuously shown. You introduced four valves to the cylinder, — two for the induction and two for the eduction of the steam; and by your device of a wrist-plate you give to each valve a rapid motion in opening and closing, and a slow motion after the closing has been effected, thus securing a perfection in valve-movements never before attained. The special object of these changes, and the *gist* of your invention, was to place the induction valves under the control of the governor, by which they are operated in opening through a mechanism from which they are released earlier or later in the stroke of the piston, according as more or less power is demanded of the engine, — the governor, with extreme sensibility, determining the point where the supply of steam should be cut off. Thus, at every stroke of the piston, just so much steam is accurately meted out to the cylinder as is needed to maintain uniform velocity, and left to expand there, and by its expansion develop the maximum of propelling force.

Allow me to read to the Academy a brief account of the Corliss engine, by one of the most eminent of British engineers, Mr. J. Scott Russell, which must needs be free from personal or national prepossession. It is from one of the official reports on the Paris Universal Exhibition of 1867.

"A third remarkable engine is American, both in invention and execution, and forms perhaps the most remarkable feature of the American department. It exhibits thoughtful design, ingenious contrivance, refined skill, and admirable execution. It is singularly unlike an English engine. It has four ports on four different parts of the cylinder, two on one side and two on the opposite, each worked by a separate mechanism. These ports are worked by valves, not sliding, like our own, on flat surfaces, but sliding valves on cylindrical surfaces. Close up to the cylinder these valves cut off the steam with scarce a particle of waste room, and so economize to the utmost the high-pressure steam which they admit, and which they use as expansively and as sparingly as possible. The mechanism by which these valves are moved is to our eye outlandish and extraordinary; but it is, in truth, refined, elegant, most effectual and judicious; it spares steam to the utmost, but develops what it uses to most effect. Then it proportions in an admirable way the doses of steam it serves out to the continually varying quantity of work the engine has to do. The mechanism of its mechanical governor is wonderfully delicate and direct; the governor is sensitive to the most delicate changes of speed, and feels the slightest demand upon the engine for more or less work and steady speed. A mechanism as beautiful as the human hand releases or retains its grasp of the feeding valve, and gives a greater or less dose of steam in nice proportion to each varying want. The American engine of Corliss everywhere tells of wise forethought, judicious proportion, sound execution, and exquisite contrivance."

It appears that within the twenty years since this machinery was perfected, more than one thousand engines of the kind have been built in the United States, and several hundreds in other countries, giving an aggregate of not less than 250,000 horse-power; that, as to economy of fuel, evidence has been afforded to the Rumford Committee, showing a saving over older forms of engine of about one third. As to its other crowning excellence,— uniformity of velocity, — the purchasers of one of the engines, now in its eighteenth year of service, certify that, with the power varying from 60 to 360 horse-power within a minute, the speed of the engine is not perceptibly affected.

It is worth noting, that when these medals were voted to you, Mr. Corliss, just a century had passed since James Watt first patented his improvements of the steam-engine. The vast results of these improvements — the difference between the engine when Watt found it and when he left it — make one of the most important chapters in the history of applied science. It is a great thing to say, but I may not withhold the statement, that, in the opinion of those who have officially investigated the matter, no one invention since Watt's time has so enhanced the efficiency of the steam-engine as this for which the Rumford Medal is now presented to you. If Watt, or his partner, Bolton, could boast that they held the supply of that which almost everybody longed to have, *power*, you may justly felicitate yourself, and permit us to felicitate you, upon your ability to supply a greater amount of steam power for the expenditure, and an exacter nicety in its governance, than any of your predecessors.

In acknowledgment of this benefit, the American Academy, administering Count Rumford's trust, now, by the hands of its presiding officer, presents to you these honorable testimonials of its high appreciation of what you have done. And the Fellows here assembled join with me, I am sure, in most sincere and hearty wishes that you may long enjoy this and similar distinctions, as well as more material rewards of your genius and skill, — hoping also that these may still be fruitful in yet other inventions, redounding to your honor and advantage and to the promotion of the good of mankind.

Mr. Corliss accepted the medals, and replied as follows: —

Mr. President, — Competitive honors are the reward of effort, stimulated by rivalry and ambition. This honor comes from gentlemen who scan the whole field of science and art, and in deliberate council make their awards in discharge of a sacred trust. To this consideration I add the historical associations connected with the American Academy of Arts and Sciences, and the scientific fame of its members; and I receive this testimonial with grateful acknowledgment of a distinguished honor.

Six hundred and sixteenth Meeting.

January 26, 1870. — Statute Meeting.

The President in the chair.

The President announced to the Academy the decease, during the past season, of two members; viz. of Thomas Graham, a Foreign Honorary Member; and of Thomas Sherwin, of the Resident Fellows.